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(54) Clamp for resilient mounting of metal bars, especially sway bars.

(57) A clamp is described for resiliently mounting e.g. a metal sway bar (10) on an automobile frame (12). The clamp comprises a U-shaped bolt (7) and plate (8), a split cylindrical rubber innerliner (9) adjacent the plate, a split cylindrical elastomeric sleeve (14) adjacent the innerliner (9) for surrounding the sway bar (10), with a layer of material between the sleeve (14) and innerliner (9) for reducing the coefficient of friction between them to a level where any slippage between the sway bar (10) and clamp will shift away from the metal sway bar to the interface between the innerliner and sleeve. This reduces wear on the innerliner and noise in use.

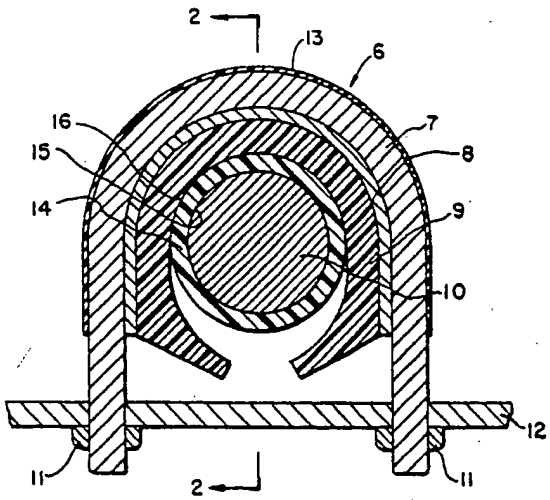

FIG.1

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CLAMP FOR RESILIENT MOUNTING OF METAL BARS, ESPECIALLY SWAY BARS

The invention relates to clamps, and especially to clamps of the type used to mount metal sway bars to automobile frames. Such clamps normally comprise a U-shaped bolt and plate which hold a split, annular rubber innerliner in compressive engagement with the sway bar, when the clamp and sway bar are properly secured to the automobile frame. Conventionally the rubber innerliner may be a separate part, or integrally moulded onto the U-shaped bolt and plate assembly.

In either case, the rubber to metal contact of the innerliner and sway bar tends to produce an annoying squeaking noise when the automobile is in operation. To combat this, it is known for the inner periphery of the rubber innerliner to be coated with e.g. Teflon (PTFE), which has a lower coefficient of friction than the rubber of the innerliner. This has proven to be a rather expensive solution to the problem, however. Moreover, the sway bars are oftentimes forged with rough outer surfaces which can quickly destroy the PTFE coating and cause the problem to reappear.

It is presently sought to provide an improved clamp, preferably suitable as a sway bar clamp, that is less susceptible to squeak and wear.

Accordingly, the invention provides a clamp for resiliently mounting a metal part, preferably a cylindrical part such as a sway bar, comprising:

a) a generally cylindrically-shaped elastomeric innerliner which is split longitudinally and designed to at least partially surround the outer surface of the metal part; and

b) means coacting between the innerliner and part for shifting the interface of slippage between the clamp and part away from the outer metallic surface of the part to the inner surface of the innerliner, closest the part.

Preferably the means of (b) above comprise:

c) a hollow cylindrical elastomeric sleeve which is separate from the innerliner and which surrounds the metal part between the part and innerliner; and

d) means coacting with the sleeve for decreasing frictional engagement between the sleeve and innerliner to a level which is substantially lower than the frictional engagement between the sleeve and metal part, so that the interface will shift away from the outer metal surface of the part. The friction decreasing means (d) may include an elastomeric coating on the sleeve adjacent the innerliner, the elastomeric coating having a low coefficient of friction. Also, there may be means for increasing frictional engagement between the metal part and sleeve, to ensure that slippage between the clamp and part occurs between the sleeve and innerliner rather than between the sleeve and metal part. A deliberately roughened inner sleeve surface is one way of achieving this. Usually the innerliner is rubber and the sleeve is plastic.

In a preferred aspect, there is provided a clamp for resiliently mounting a cylindrical metal part, such as a sway bar, comprising:

a) a metal bolt, preferably U-shaped, with a pair of opposing ends;

b) a parti-cylindrical metal plate adjacent the inner periphery of the bolt, the plate having a pair of opposing marginal edges;

c) a rubber innerliner, having a generally cylindrical inner surface, adjacent the inner periphery of the plate in spaced relation from the bolt, the innerliner being split longitudinally between the marginal edges of the plate;

d) a cylindrical elastomeric sleeve, separate from the metal part and innerliner, designed for placement around the metal part; and

e) means coacting between the sleeve and innerliner for decreasing the friction between them; so that any slippage, caused by relative movement of the clamp and part, will occur at the interface between the sleeve and innerliner rather than at the interface between the sleeve and metal part. The plate helps to stabilise the innerliner in shape around the sleeve and metal part.

Means may be provided coacting with the innerliner for encasing the bolt and plate in elastomeric material, to form an integral clamp assembly for easy handling.

The properties of the friction decreasing means (e) may be selected according to application and design requirements, in order to achieve the desired preferential shifting of the slip interface. In one version the friction decreasing means (e) consists of an elastomeric layer with a coefficient of friction as low as, or lower than, that of silicone or "Teflon" (PTFE).

In another aspect, the invention provides a sway bar assembly including one or more clamps as described.

It will be seen from the above that the invention solves the problem of the prior art by shifting the interface of slippage between clamp and part (e.g. sway bar) away from the "unfriendly" metal surface of the sway bar to a "friendly" interface of the clamp.

A suitable sway bar clamp embodying the invention comprises an assembly of a U-shaped metal bolt and plate with a rubber innerliner and an

elastomeric sleeve which is separately mounted around the sway bar. Either the outer periphery of the sleeve, or the inner periphery of the innerliner, or both, may be coated with a low friction material so that any slippage, caused by movement between the clamp and sway bar, occurs between the elastomeric materials in radially spaced relation from the metal sway bar.

An embodiment is now described by way of example with reference to the accompanying drawing, wherein:

Fig. 1 is a cross-section of a sway bar clamp, showing the clamp in relation to an automobile frame; and

Fig. 2 is a section of the clamp viewed from the line 2-2 of Fig. 1.

With reference to the drawing, there is shown a sway bar clamp which comprises a U-shaped bolt 7 in juxtaposed relation to a matingly configured cylindrical plate 8, which is sandwiched between the bolt 7 and a generally cylindrical innerliner 9 which is composed of any suitable elastomeric material, e.g. rubber. The innerliner 9 is split longitudinally and normally designed to surround and compressively engage a sway bar 10, when the clamp 6 and attached sway bar 10 are fastened by nuts 11 to an adjacent automobile frame 12. The innerliner 9 may be moulded to the bolt 7 and plate 8, both of which are covered by an outer layer 13 of the elastomeric material during the moulding process to form an integral clamp assembly for easy handling.

A separate, hollow cylindrical sleeve 14 is interposed between the rubber innerliner 9 and metal sway bar 10. The sleeve 14 is composed of any suitable elastomeric material, e.g. plastic, and may also be split longitudinally for easy mounting on the sway bar 10 before the placement of the innerliner 9, plate 8 and bolt 7 around the elastomeric sleeve 14 and sway bar 10.

It is important to shift the interface of slippage between the clamp 6 and sway bar 10 away from the unfriendly metallic surface of the sway bar 10. This is accomplished by increasing the frictional engagement between the sway bar 10 and elastomeric sleeve 14 and decreasing the frictional engagement between the rubber innerliner 9 and elastomeric sleeve 14, so that the difference between the two will be sufficient to shift the interface of slippage away from the metal-to-elastomer interface of the sway bar and sleeve to the elastomer-to-elastomer interface of the sleeve and innerliner. Accordingly, the inner cylindrical surface 15 of the elastomeric sleeve 14 which contacts the sway bar 10, is moulded or extruded with knurls or serrations to provide a rough inner surface with a high coefficient of friction. The outer cylindrical surface 16 of the elastomeric sleeve 4 which contacts the rubber innerliner 9 is treated in an opposite manner, i.e. it is coated with any suitable material which has a low coefficient of friction, such as Teflon (Trade Mark) or silicone. Thus, the difference between the coefficients of friction of the two interfaces is substantial and sufficient to cause slippage between the clamp 6 and sway bar 10 to occur preferentially at the interface of the two elastomers; namely, the rubber innerliner 9 and elastomeric sleeve 14.

Various elastomeric compositions may be used for the sieeve 14 and for the low friction coating on its outer surface 16. The skilled man will be able to select appropriate materials in dependence on the design requirements, which vary from application to application. For example, these compositions would probably differ depending on whether the clamps are used on small passenger vehicles, or large heavy trucks. Whichever the case, it is necessary to shift the interface of slippage between the clamp 6 and sway bar 10 away from the unfriendly metal surface of the sway bar to a friendlier interface for longer wear and better performance.

Thus, there has been described a sway bar clamp with a slip bearing which is simple and inexpensive to manufacture. This slip bearing may eliminate undesirable squeaking noise and is less susceptible to destruction by the sway bar to which the elastomeric sleeve clings and acts as a protective shield for the rubber innerliner of the clamp.

Claims

1. A clamp for mounting a metal bar (10) resiliently, by clamping it in an elastomeric innerliner (9) split longitudinally to receive the metal bar (10) and surround it at least partially, characterised in that the clamp further comprises means (14) for acting in use between the metal surface of the received bar (10) and the surrounding surface of the innerliner (9) to separate the surfaces and to shift the interface of slippage, due to relative movement between bar and clamp in use, preferentially to the innerliner surface away from the metal surface of the bar (10).

2. A clamp according to claim 1 wherein the means (14) comprise a layer of elastomeric material having a coefficient of friction with the innerliner (9) sufficiently low to cause the preferential slippage between them.

3. A clamp according to claim 2 wherein the layer is formed by an elastomeric sleeve (14) for surrounding the metal bar (10), separate from the innerliner (9) and adapted to cause lower frictional

engagement between the sleeve (14) and innerliner (9) than between the sleeve (14) and the metal bar surface.

4. A clamp according to claim 3 wherein the sleeve (14) is longitudinally split.

5. A clamp according to any one of claims 2 to 4 wherein the layer has a coating of low-friction material on parts (16) contacting the innerliner (9) in use.

6. A clamp according to any one of claims 2 to 5 wherein the elastomeric layer has an inner surface (15) which is rough, to cause a high coefficient of friction with the surface of the metal bar (10).

7. A clamp according to any one claims 2 to 6 wherein the innerliner (9) is of rubber and the layer (14) is of plastics elastomer.

8. A clamp according to any one of the preceding claims, comprising a metal plate (8) for holding the innerliner (9) in a stable shape urged against the metal bar (10).

9. A clamp according to claim 8, wherein a U-shaped retaining bolt (7) curves around the stabilising plate (8).

10. A clamp according to claim 9 wherein the bolt (7) and plate (8) are retained together and encased in an elastomeric part integrally comprising the innerliner (9).

11. A clamp according to any one of the preceding claims which is for resiliently mounting a substantially cylindrical metal part, such as a sway bar (10), the innerliner (9) and means (14) presenting substantially cylindrical surfaces.

12. A clamped sway bar assembly comprising a substantially cylindrical metal sway bar (10) resiliently mounted on a frame (12) by at least one clamp according to claim 10.

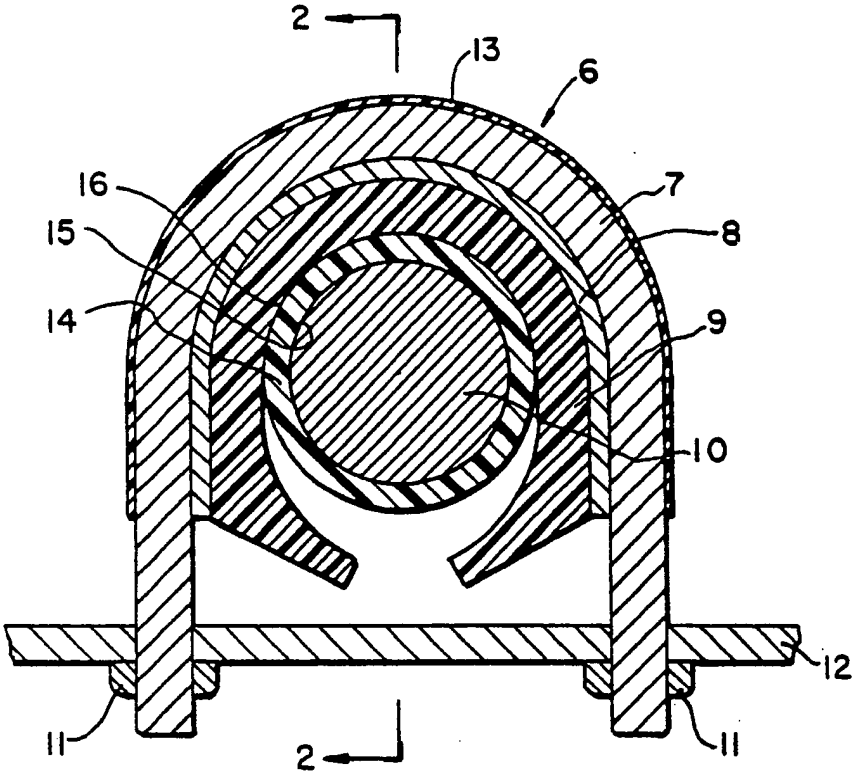

FIG. 1

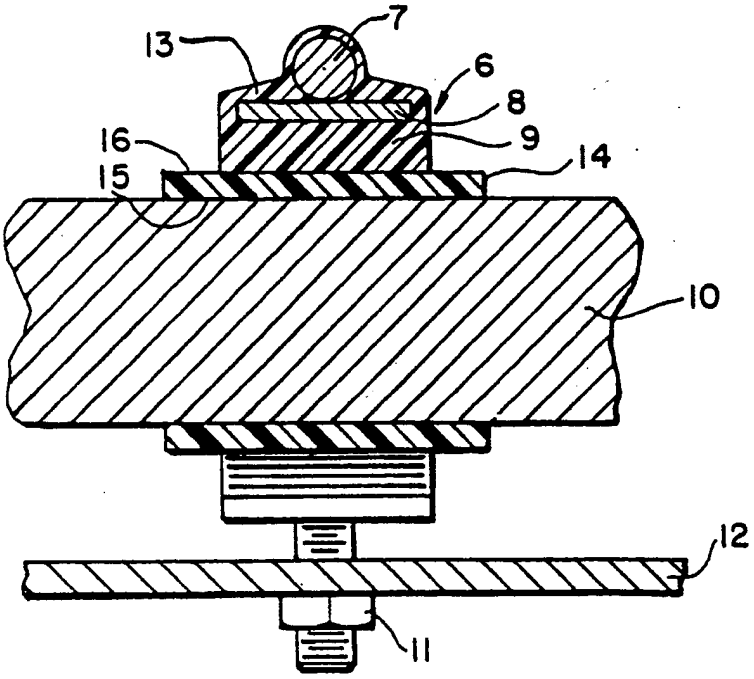

FIG. 2

European Patent Office

EUROPEAN SEARCH REPORT

Application number

DOCUMENTS CONSIDERED TO BE RELEVANT

EP 89302601.3

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
A	FR - A - 2 223 583 (KÄSSBOHRER) * Fig. 1; page 2, lines 30ff * --	1,2,3, 7,8	B 60 G 21/04 F 16 F 1/38 F 16 B 9/02
A	GB - A - 1 481 309 (UNITED CARR) * Fig. 1,8,9; page 2, lines 38-41 * --	1,4	
A	DE - B - 1 014 391 (ILLINOIS) * Fig. 1,9 * --	1	
A	EP - A2/A3 - 0 132 502 (JÖRN) * Fig. 5,6 * --		
A	GB - A - 1 516 572 (JOERN) * Fig. 3-6 * --		TECHNICAL FIELDS SEARCHED (Int. Cl.4)
A	DE - A1 - 3 531 340 (LEMFÖRDER) * Fig. 2 * --		B 60 G F 16 F F 16 B
A	GB - A2 - 2 032 054 (DUNLOP) * Fig. 1,2 * --		
A	EP - A1 - 0 251 845 (PEUGEOT) * Fig. 1-3 * --		
A	EP - A1 - 0 227 869 (RENAULT) * Fig. 1-3 * ----		

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
VIENNA	06-07-1989	PANGRATZ

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
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E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

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